

# STATUS OF THE MULTI-ANGLE IMAGING SPECTRORADIOMETER INSTRUMENT FOR EOS-AM1 AND ITS APPLICATION TO REMOTE SENSING OF AEROSOLS

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The Multi-angle Imaging **SpectroRadiometer** (MISR) instrument is currently under development at JPL for the AM 1 spacecraft in the Earth Observing **S ystem**(**E OS**) series. Launch is scheduled for June 1998. MISR consists of nine **CCD**-based push broom cameras, and is capable of global coverage every nine days from the EOS polar orbit. Each of the cameras is manufactured using one of four optical prescriptions, varying in focal length from one design to another to equalize cross-track sample spacings. One camera points toward the nadir, one bank of four cameras points in the forward direction with view angles at the surface ranging from 26.10 to 70.5°, and one bank of four cameras symmetrically points in the aftward direction. The sample spacing on the ground is 275 m and can be averaged, in flight via ground command, up to 1.1 km. Each camera provides imagery in spectral bands centered at 443,555,670, and 865 nm. This measurement strategy provides systematic multi-angle imagery of the Earth for studies of tropospheric aerosols, surface radiation, and clouds. An On-Board Calibrator consisting of deployable solar diffusers and a set of stable photodiodes provides a high-accuracy detector-based calibration. In this paper we report on the progress of the instrument fabrication and testing and focus on the application of MISR's unique observational strategy to studies of tropospheric aerosols,

Development of the MISR Engineering Model (EM) is planned through the spring of 1995, transitioning during this period to the manufacture of the first flight instrument, named the **Protoflight Model** (**PFM**). The **EM** is a partial prototype for the flight instrument, containing two of the nine cameras (with the shortest and longest focal length lenses), and a subset of the calibration hardware. A description of the fabricated hardware and results of **EM** testing will be presented, concentrating in particular on those aspects of the instrument **performance** which are relevant to its scientific applications.

Theoretical simulation studies and experimental retrievals using the Advanced Solid-state Array **Spectroradiometer** (ASAS) airborne multi-angle imager are under way to establish MISR'S ability to retrieve the optical depth of tropospheric aerosols and to distinguish among aerosols of various sizes and compositions. Given the instrument data rate of several Mbps and the large volume of data generated, aerosol retrievals must be computationally efficient. The MISR aerosol retrieval strategy involves generation, prior to launch, of a set of aerosol models containing a wide range of compositions and sizes. Data processing then searches for the best match with the MISR observations over 17.6 km x 17.6 km regions, for both ocean and land. Status of algorithm **proto**-typing efforts will be described and results of sensitivity studies will be presented.